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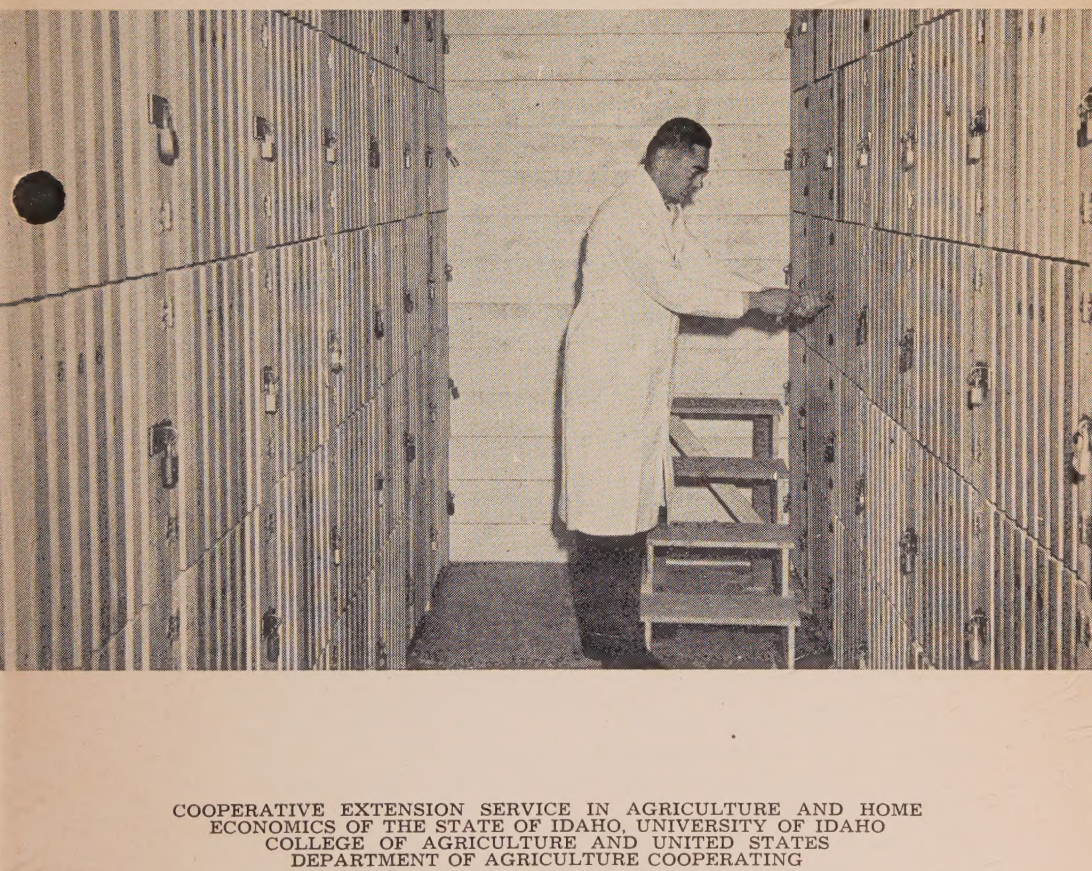
Freezing Foods For Use in the Home

W. P. Lehrer, Jr., and James E. Kraus



COOPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS OF THE STATE OF IDAHO, UNIVERSITY OF IDAHO COLLEGE OF AGRICULTURE AND UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

ANIMAL HUSBANDRY AND HORTICULTURE SECTIONS

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To Obtain the Best Product

1. Process fruits and vegetables immediately after harvesting.
2. Avoid over-aging meats and over- or under-blanching vegetables.
3. Select only the best quality product for freezing.
4. Use the best packaging materials available.
5. Make packages the correct size for a single meal.
6. Thawed products should not be refrozen.
7. Use thawed products as soon as possible.
8. Do not over-cook frozen products.

Freezing Foods For Use in the Home

W. P. LEHRER, JR., AND JAMES E. KRAUS*

Introduction

FOOD preservation by freezing has become one of the most important developments in agriculture in recent years. Freezing is by far the best way to preserve the natural fresh flavor and texture of food products. Fruits and vegetables retain their natural color to a large extent when preserved by freezing. Furthermore, freezing preserves the vitamins present in these products better than any other method.

With the advent of frozen food locker facilities, and with the probable large increase in home freezer units, more vegetables, fruits and meats can be preserved by freezing than ever before. Freezing will provide a more varied and better balanced diet, and enable the consumer to have fresh meat, fruits and vegetables throughout the year.

Another reason many consumers appreciate freezing is that it usually requires considerably less work than other methods of preservation.

Containers

There will be a steady loss of moisture (drying) from products stored in freezers unless they are protected by the right kind of wrapping or packaging. There are containers and wrapping papers on the market designed to reduce moisture loss. Many have other features especially desirable for freezer storage.

An ideal container or wrap is one that is cheap, moisture proof, air tight, easy to fill, seal, and open, and economical of storage space. Rectangular cartons that are not too deep and which are provided with easily sealed liners come the closest to this ideal. Because of their shape their contents may be frozen most quickly and they make the fullest possible use of the storage space. Cylindrical cartons are easier to fill and more nearly leak proof, which makes them better suited for syrup-covered fruits and brine packed poultry. However, like all other cylindrical containers, they waste space. Glass jars are very good containers. They do have the disadvantages of being space wasters and breaking easily if not handled with care. Wide-mouth jars are best because they are more easily filled and emptied. Precaution should be taken to leave 1 to 1½ inches head space to allow for expansion especially with brine or syrup packs. The jar lids and rubbers are put on as for canning but it is not necessary to heat seal them as in canning. Tin cans are also very good containers but are rather disagreeable to handle when cold and difficult to empty. However, both jars and cans have

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one primary advantage—namely, almost complete elimination of oxidations and moisture loss.

Cellophane paper is a very desirable freezer wrap. It may be had either in rolls or bags and lends itself well for all types of meat wrapping. It can be sealed with heat by using either a curling iron or clothes iron. An iron at heat suitable for ironing silk is about right.

Wax-coated papers are suitable for wrapping foods. However this type of paper is not so good for extended storage periods as is cellophane.

All types of freezer paper should be protected by an outside wrap of either good butcher paper, stockinet or paper cartons.

Containers and freezer paper are usually for sale at cold storage locker plants.

Labeling the Product

All products should be labeled clearly with a waterproof pencil. Labeling should include the name of the product, the wrapping date, and in the case of meat, the weight of the cut. When removing food products from the locker for home use, the older products should be removed first. This avoids the possible over-storage of some packages.

Freezing and Storage

Sharp Freezing

Sharp freezing is the immediate exposure of a food product to extremely low temperatures. Most commercial locker plants have a room or compartment for this purpose. Sharp freeze temperatures are generally kept around 20° F. below zero. Food packages should be placed in this unit so they do not touch each other. This enables uniform freezing of the product. **If available, sharp freezing should be used for all meats, poultry, fish, fruits and vegetables.** The faster fruits and vegetables are frozen, the better they hold up after they are taken out of storage.

Storage Temperatures

After foods have been frozen, a temperature from zero to 10 degrees below zero is ideal for holding them in good condition. Wide temperature fluctuations are likely to cause alternate freezing and thawing of syrup-covered fruits which in turn will cause deterioration. At temperatures above 10° F. considerable water is likely to be lost and above 15° F. bacterial action will take place and spoilage may result.

Preparing Meats for Freezer Storage

Meat Selection

Finish (fat) is more important than weights of animals killed. Excessive finish is not necessary, but ample covering improves meat flavor and tenderness and protects the lean from excessive drying

during freezer storage. The highest quality meat comes from animals having adequate age, conformation, quality and finish. In cattle a size range of 600 to 1,200 pounds and an age range of 1 to 2 years generally assures meat of good quality. Veal calves allowed to nurse until killing time furnish palatable and tender meat; those weighing 125 to 175 pounds produce cuts of desirable size. Hogs weighing 180 to 225 pounds offer the most easily handled cuts. Lambs 5 to 8 months of age generally furnish cuts offering desirable size and finish.

The housewife, butcher, and freezer operator may well bear in mind that poor meat does not improve with age in freezer storage. Only quality products, properly handled, well wrapped and labeled are worth putting into food lockers. All products, regardless of quality, will deteriorate to some extent in processing and storage. The higher the quality, the less the deterioration, if the product has been handled properly.

In rural sections farmers do most of their own butchering. In some localities the commercial freezer storage plants offer a butchering, cutting, and wrapping service at a reasonable charge. Wherever the butchering is done, sanitation and proper handling cannot be over-stressed.

Handling Meats Before Freezing

Animals should be kept off feed for 24 hours before slaughtering, but should have free access to all the water they desire. Slaughtering may be done at any time.

A good "stick" and a clean job of dressing are important. Contaminated or bloody meat will not keep as well as that which has been properly handled. Thoroughly skin or scrape the carcass, eviscerate and wash before chilling.

Especially in warm, damp weather the owner must take care to prevent spoilage. The sooner the carcass goes to the chill room after dressing the better and safer it will be.

Chilling—Freshly slaughtered carcasses will spoil very rapidly if not chilled soon after dressing. Temperatures ranging from 33° to 38° F. provide a rapid chill and will prevent the meat from spoiling. Warm carcasses that are hung so they do not touch will chill more uniformly. Hog and beef carcasses, if split, will chill more rapidly. Carcasses should be allowed to chill for 36 to 48 hours before being divided into the desired cuts (*See Table* 1).

Aging—Package and freeze pork, poultry, and fish as soon as they are thoroughly chilled. Beef and lamb will become more tender if held in the chill room for 5 to 10 days after slaughter. During this aging period the tissues are broken down by bacterial and chemical action and the meat is tenderized. The length of aging period for beef, lamb, and big game will depend upon the degree of finish of the carcass. The more finish the longer the carcass can age before

excessive mold develops. Seven to 10 days is long enough for well-fattened beef and lamb, while 5 days is about the right aging period for lean carcasses *(See Table 1)*. Well fattened, young carcasses when properly aged will produce more tender meat than carcasses from older, thinner animals.

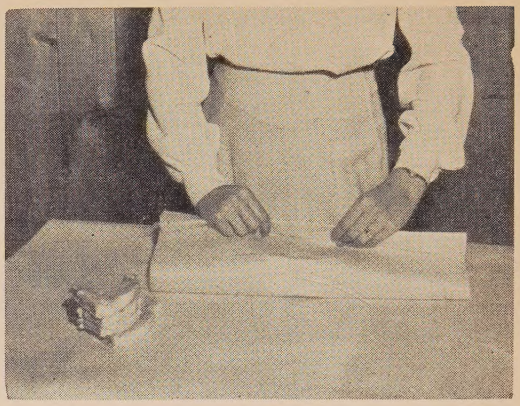

Figure 1. Wrapping meats with the fold or "drug store" seam.

Cutting Meat

To save space in lockers, bone the cuts and trim into smooth, compact pieces. This also saves oven space and fuel during cooking, and permits easier handling when serving. The thickness of steaks and chops, size of roasts, amount of ground meat, proportion of fat, and type of seasoning in the sausage should be regulated to meet family reguirements.

Ground meat will keep about 3 months if packed in good moisture-proof, vapor-proof containers. All seasoning except salt may be added to sausage. Add salt when the sausage is prepared for cooking after being removed from the freezer and thawed.

Cured pork, if well wrapped, may be stored in lockers during warm and damp weather to prevent mold and other damages.

Game

Inquire into state regulations before either game or fish is prepared for freezing.

Table 1.—Freezing Meats, Game, Poultry, Fish and Eggs

Meat	Chilling after slaughter (33-38°F) (Hours)	Aging (days)	Length of storage at 0°F. (Months)
Lean beef	36-48	5-7	8-10
Fat beef	36-48	7-10	8-10
Pork	36-48	none	4-6
Lean lamb	36-48	5-7	6-9
Fat lamb	36-48	7-10	6-9
Veal	36-48	1-3	6-9
Mutton	36-48	5-10	6-9
Ground beef	.....	.....	2-3
Sausage	.....	none	2-3
Cured pork	.....	none	10-12
Elk and venison	36-48	5-7	8-10
Poultry	24	none	6-10
Fish	24	none	3 6
Eggs	.....	none	6-8

Freshly killed game should be thoroughly bled, dressed, split and chilled the same as domestic meat animals. Muscles that have been torn by bullets should be well trimmed. Large game animals, to be tender, should be aged a short period of time, 5 to 7 days, before cutting and packaging. Small game animals such as rabbits, should be skinned, dressed, washed and chilled promptly after killing. In order to save locker space, freeze only the thick back and hindquarters.

Game birds are handled like poultry and keep very well in food lockers.

Figure 2. Sealing cellophane with hot clothes iron.

Poultry

Poultry, like large animals, should be fasted, but allowed water, for 24 hours before killing. Only healthy, plump birds suited to the family needs should be used. The birds should be well bled and semi-scalded in water at about 130-140° F. (126-130°F. for broilers and fryers) for ½ minute or until feathers pluck easily. When water of this temperature is used the skin is not cooked and remains intact thus keeping the surface of the carcass from drying out while in storage.

After plucking, singe the carcass, draw, and wash both inside and out. Chill the birds thoroughly at a temperature of 33° to 38°F. before wrapping and placing in the locker. To save locker space, birds that are to be used as fryers or fricassee can be cut into the desired size pieces before wrapping for freezer storage. Roasters can be wrapped with the carcass intact, wrapping the heart, gizzard and liver in a separate piece of waxed paper and placing in the body cavity. Broilers should be split.

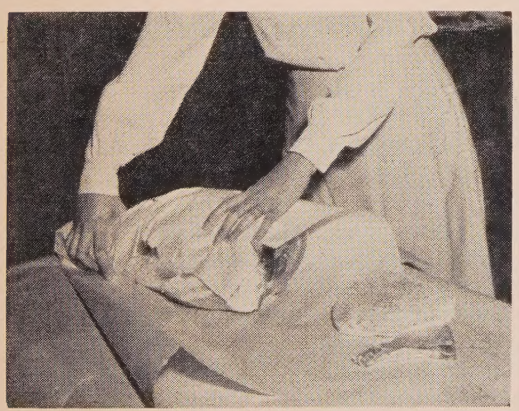

Figure. 3. Wrapping fresh ham with waxed paper.

Another procedure suggested for chicken which is cut up for frying or stewing is to pack tightly in cans or cartons and cov-

er with a salt water solution (1-2 tsp. salt to 1 qt.). Chicken preserved by this method is most comparable to freshly killed birds.

All poultry must be drawn before placing in freezer storage.

Fish

Chill fish as soon after catching as possible. Never allow fish to become warm.

All fish that is to be prepared for freezing should be scaled or skinned, dressed and washed. Remove the head, tail and fins from small fish and freeze them whole. Cut large fish into steaks or boneless strips (fillets).

All fish in frozen storage dry rapidly and should be wrapped very carefully in a good grade of freezer paper and frozen promptly.

Figure 4. Showing two types of stockinet wrap. The fresh ham was first wrapped in waxed paper and the pork chops in cellophane. Both products were then covered with stockinet.

To Glaze Fish or Poultry

Fish and poultry may be glazed with ice by freezing the cuts unwrapped and then dipping them one or more times in near-freezing water, permitting the film of water to freeze each time the cut is dipped. The glazed, frozen cut should then be wrapped in moisture-vapor-proof paper.

Glaze on frozen cuts may need to be renewed every 4 to 10 weeks because of cracks or scaling of the ice.

Freezing Eggs

Cleanliness cannot be over-stressed in the preparation of eggs for freezing. Fresh, clean eggs *only* should be used for freezer storage.

Break the eggs separately into a clean dish, making sure each egg has no stale or musty odor and then transfer the egg into a clean mixing bowl. To every cup of liquid whole eggs add 1 tablespoon light-colored corn syrup or sugar or 1 teaspoon of salt. Choosing the sweetening or salt depends upon the way the eggs are to be used. Break all the yolks and mix the yolks and white thoroughly, but do not whip any air into the mixture.

Mild whipping and the addition of salt, syrup, or sugar helps to prevent gumminess in thawed eggs.

The white and yolk may be separated and frozen in separate containers. Separated whites do not require any mixing or anything added. They may be packed and frozen immediately. To each cup of egg yolks add 2 tablespoonfuls of sugar or light-colored corn syrup or 1 teaspoon of salt and mix just as for whole eggs.

1 tablespoon yolks = 1 egg yolk
2 tablespoons whites = white from 1 egg
1 cup mixed egg yolks and whites = 5 whole eggs

ALWAYS USE THAWED EGGS PROMPTLY

Thawing Frozen Meats

Poultry and eggs are usually thawed before they are used in meal preparation. Steaks, chops and roasts can be cooked without preious thawing.

Thawing may be done in three different ways —

(1) **During cooking**—Frozen meats may be thawed in the process of cooking. Extra time, however, is needed to cook the meat thoroughly. Allow 15 to 20 minutes extra per pound for roasts and 10 to 15 minutes extra per pound for steaks if cooked without thawing. Use a slow to moderate heat for cooking, or the meat may remain frozen in the center and still appear cooked on the outside. The use of a meat thermometer is the only sure way of knowing when a roast is done. To insert a meat thermometer in frozen meat, first make a hole with an ice pick and carefully push the thermometer into position. Chill the thermometer before inserting.

(2) **In the refrigerator**—This method requires 5 to 8 hours per pound to thaw in a refrigerator held at a temperature of 40° F.

(3) **At room temperature** (70° F.)—Meats require 2 to 3 hours per pound to thaw.

DO NOT THAW MEATS IN WARM WATER. USE THAWED MEATS PROMPTLY. DO NOT RE-FREEZE THAWED MEAT.

Packaging and Wrapping

Wrap just enough meat for a single meal in each package. This makes handling easier at the time of use. The number of steaks and chops, quantity of ground meat and sausage per package should be regulated to meet family requirements. When more than one steak or chop is put in a package, waxed or cellophane paper between the cuts will aid in separating them when preparing for cooking. To prevent meat from drying, squeeze all air out of the package before sealing it.

Freezing Fruits and Vegetables

Selecting Material

Some fruits and vegetables do not produce a satisfactory frozen product. For this reason the consumer should not attempt to freeze

the following: cantaloupes, celery, cress, cucumbers, endive, green onions, lettuce, parsley, whole pears, grapes, radishes, watermelons and tomatoes (whole).

Others produce satisfacory products but are not usually frozen because they can be stored or canned and give practically as good a product as by freezing. Included in this class are cabbage, hot peppers, the root crops, Irish potatoes, squash and pumpkins. The locker space should be used mostly economically, and therefore only those fruits and vegetables should be frozen which are very perishable and which give a frozen product of better quality than if preserved by some other method. One should always remember that freezing adds nothing that is not there to start with and it is essential that only the best material be used. Freezing requires the use of sound fruits and vegetables of suitable varieties which have been harvested in the proper stage of maturity. They should be harvested when they are in prime condition for eating fresh and probably in most cases should be harvested slightly less mature than if they were to be used for canning. Recommended crops and varieties for freezing are listed in tables 2 and 3.

Washing and Sorting

Careful selection should be followed by thorough washing and sorting to remove all parts that are bruised diseased, unripe, overripe or otherwise undesirable. Each minute between harvesting and freezing is a minute in which these fresh products lose some of their superior eating quality and high vitamin content. Speed will hold these losses at a minimum. High temperatures accelerate this deterioration so, at all times, keep them as cool as possible. If freezing can not be done immediately after harvest store at as near 32° F. as possible. Store peas or lima beans in the pod and corn in the husk. Quality is much more likely to be retained than if the outer coverings are removed. **However, do not store fresh produce unless absolutely necessary but freeze as quickly after harvesting as possible.** Handle all produce carefully to avoid bruising. Remember that the product you take out of the locker will be no better than the product you put in.

Processing Fruits

As soon as the fruits have been cleaned and sorted, they are treated with sugar either in a dry form or as a syrup. The sugar aids in preventing the growth of bacteria and molds. It also helps to exclude air from the fruit thereby reducing possible discoloration and losses of flavor and aroma.

Dry Pack

When the dry pack method is used, the required amounts of fruit and sugar are mixed together until the sugar is dissolved in the juice of the fruit. One cup of sugar to 5 cups of fruit is an average recommendation. More or less sugar may be used to suit the taste. The mixture is placed immediately into suitable contain-

ers leaving a small space (about one-tenth of the total volume) to take care of expansion when the fruit is frozen.

Syrup Pack

If syrup is used, the fruit is placed directly in the containers and the syrup poured over it, leaving a small space at the top as suggested above. Chill the syrup before adding it to the fruit. Filled containers are sealed immediately and put in a cool place until they can be taken to the freezing plant.

Table 2.—Recommendations for freezing preservation of fruits.

Fruit	Suggested varieties	Preparation	Pack
Apricots	Blenheim, Tilton, Royal, Perfection	Peel if desired, halve, and pit. Work fast.	50% syrup
Blackberries	Any large fruited variety	Discard small, seedy, poorly colored berries.	50% syrup or 5 to 1*
Blueberries Huckleberries	Most varieties suitable	Discard small, poorly colored berries.	50% syrup
Cherries, Sour	Montmorency, May Duke, Earl Richmond	Do not pick until tree ripe. Remove stems and pit.	60% syrup or 5 to 1
Cherries, Sweet	Bing, Lambert	Same as for sour cherries.	40% syrup or 5 to 1
Peaches	Elberta, J. H. Hale, Slappey, Vedette Crawford, Candoka	Dip in boiling water, peel, pit and slice. May be crushed with dry sugar. Work fast.	50% syrup or 5 to 1
Plums and Prunes	Italian and French Prunes, Damson Plums	Select tree ripened fruit that has not shriveled. Halve and pit or leave whole.	50% syrup
Raspberries, Black	Cumberland, Plum Farmer, Munger, Gregg	Best used for pie, jam, or juice.	50% syrup or 5 to 1
Raspberries, Red	Latham, Cuthbert, Lloyd George, Newburgh, Marcy, Washington	Handle carefully to avoid bruising.	50% syrup or 5 to 1
Strawberries	Dunlap, Howard 17, Marshall, Dorsett	Crush and mix with sugar or pack whole with syrup.	60% syrup or 5 to 1

*5 cups of fruit per cup of sugar.

Making Syrups and the Use of Sugar Substitutes

Because of the shortage of sugar there has peen much interest in methods of reducing the amount of sugar used in freezing fruits and substitutes which might be used for sugar. For the best quality product a 40% to 50% sugar syrup is recommended for most fruits. However, lower percentages may be used with success, although the quality will not be as good as with more sugar. A 25% sugar syrup will give fair results. Directions for syrups of various densities are as follows:

20% syrup—1 cup sugar plus 4 cups water
25% syrup—1 cup sugar plus 3 cups water
33% syrup—1 cup sugar plus 2 cups water
40% syrup—1 cup sugar plus 1½ cups water
50% syrup—1 cup sugar plus 1 cup water

Honey may be used as a sugar substitute and it gives a rather satisfactory product. Make a light syrup using equal amounts of honey and water. Honey may also be combined with sugar to make a satisfactory syrup. The usual proportion recommended is 1 part honey to 1½ parts of sugar and 2 parts of water.

Corn syrup can be used for fruits although the resulting product will not have the flavor or color of that preserved in sugar syrup. Corn syrup is only about one-half as sweet as sugar. It is suggested that only the white corn syrup be used and that it be used in about the same way as honey.

Processing Vegetables

Blanching

The washed and sorted vegetables first must be blanched in boiling water or in steam. Blanching reduces the number of bacteria in them and destroys many of the enzymes which cause deterioration during storage. Failure to carry out this operation adequately will result in a loss of flavor and vitamin C during storage.

All vegetables can be blanched satisfactorily in boiling water, but some, such as sweet corn and snap beans, have better quality if blanched in steam. However, steam is not recommended for the average home gardener because it is more difficult to use and requires a longer blanching time.

Since the temperature of boiling water varies with elevation, the blanching time should be increased to conform with the altitude. The blanching times given in Table 3 are for sea level or altitudes up to 1000 feet. For altitudes above 1000 feet add 15 seconds blanching time for each additional 2000 feet.

Blanching is accomplished by immersing the vegetables in rapidly boiling water for the required length of time. A collander is handy for this work. Use at least one gallon of water for each pound of vegetables. It is better to use two gallons of water per pound for the leafy vegetables such as spinach. The blanching time should start at the point when the water again comes to a rolling boil after immersion of the vegetables.

After blanching, cool the vegetable immediately in running tap water or ice water. Allow it to cool all the way through or about the same length of time it took to blanch it. Drain off all excess water and pack in suitable containers.

Dry or Brine Pack

Vegetables may be packed dry or covered with a 2% brine (4 teaspoons of salt per quart of water). Dry pack is considered the

Table 3.—Recommendations for freezing preservation of vegetables.*

Vegetables	Suggested varieties	Preparation	Blanching time in minutes	Cooking time in minutes
Asparagus	Martha Washington, Mary Washington	Cut spears to 5 inch length, handle quickly.	small-2 medium-3 large-4	5-8
Beans, Snap	Tendergreen, Stringless Green Pod, Blue Lake, Round Pod Kidney Wax	Snap ends off, cut in 1-inch lengths.	3	12-15
Beans, Lima	Henderson Bush, Clarks Bush, Cangreen, Thorogreen, Fordhook 242, Early Market	Handle quickly after shelling, pack dry.	small-1½ large-2-3	4-6
Broccoli	Calabrese or Italian Green Sprouting	Separate heads into pieces 1 in. or smaller in thickness	3-3½	4-6
Cauliflower	Early Snowball, Danish Giant	Cut curd in small pieces not over 1 inch thick.	2	4-6
Corn (cut)	Golden Bantam, Carmelcross, Seneca Golden, Golden Cross Bantam	Blanch on cob, cut corn off, rinse kernels quickly in cold water, skim off chaff, drain.	3-4	3-4
Corn (on cob)	Same as above	Blanch, cool in cold water, drain, package.	small dia-7 medium dia-9 large dia-11	3-4
Peas	Thomas Laxton, Gradus, Hundredfold, Laxton Progress, Alderman	Handle quickly after shelling.	small-1 large-1½	6-8
Spinach or other greens	King of Denmark, Long Standing Bloomsdale, Nobel Giant	Use only tender foliage, handle carefully, dry pack.	2	4-6

best method for most vegetables. If brine is used, chill it first and leave head space to allow for expansion in freezing. Seal packages immediately and freeze as quickly as possible.

The Process in Brief

Sort, wash, blanch, cool, drain, pack, seal, and freeze.

Using Frozen Foods

Do not remove more packages from your locker than you can use within a few days. Frozen foods break down rapidly at high temperatures. The freezing compartment of the average home refrigerator is not cold enough to hold them in good condition for a long period of time.

Frozen fruits may be served as dessert, either alone or as a supplement to some other dish such as ice cream or shortcake. They also may be used in baking. Thaw and use while still cold. They lose quality rapidly after thawing.

If you are in no hurry, the best way to thaw fruits is to put them in the refrigerator or ice box over night. By this method they thaw evenly throughout. If allowed to stand at room temperatures, the outside becomes soft while the center still is frozen. If speed is essential and the fruit is in a water-tight container, place it in a pan of cool water. In any case do not remove the fruit from the package until you are ready to use it. The fruits will discolor if exposed to the air for a very long time.

Cooking Frozen Vegetables

To conserve vitamin C the vegetables should be cooked without thawing. A relatively small amount of water is used—about ½ to ¾ cup per pint of vegetables. This water is seasoned and brought to a boil in a pan with a tight fitting lid. The frozen vegetables are placed in the boiling water and, as soon as they have partially thawed, a fork may be used to break them apart. When boiling has been resumed, after adding the vegetables, time the cooking according to the recommendations in Table 3. One of the common mistakes made in cooking frozen vegetables is to cook them too long. Brine packed vegetables should be thawed before cooking. They may be cooked in their own brine with a little water added.

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